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A Guide to Standardizing After Action Review (AAR) Aids

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Simulator Systems Research Unit

U.S. Army Research Institute for the Behavioral and Social Sciences

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for the Behavioral and Social Sciences

A Directorate of the U.S. Total Army Personnel Command

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The After Action Review (AAR) is an interactive discussion conducted following collective training exercises to help units decide what happened, why it happened, and how to improve future performance. AAR aids can be employed to refresh memories regarding exercise events, provide new perspectives about exercise events, convince participants of the existence of performance problems, stimulate participation in the AAR process, and document the outcomes of the AAR. The AAR process is intended to apply in live, virtual, constructive, or mixed environments. The Standard Army AAR System (STAARS) concept includes the use of standardized AAR products/aids that can be used across training environments. This guide clarifies the concept of AAR aid standardization, describes the substantial benefits to be gained by standardization, describes general types of AAR aids, discusses the utility of each type of aid, and presents a technique for defining a standardized set of AAR aids for a specific unit type and echelon.

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Training Systems and Education

FOREWORD

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has been actively involved in the development of After Action Review (AAR) methods and tools for the live, virtual and constructive training environments beginning with the development of tactical engagement simulation in the mid-seventies. Many of the findings from this work have been incorporated within the Standard Army AAR System (STAARS) concept which includes the proposed standardization of AAR products across training environments for each unit type and echelon.

This report describes the functions AAR aids can serve, differences among functions served by various types of AAR aids, and the benefits and costs of standardizing AAR aids across training environments. This report also clarifies the concept of standardized AAR aids, and it describes a technique for defining a standard set of AAR aids for a particular unit type or echelon.

The work described in this report is a portion of research task 2114, SYNTRAIN: Distributed Interactive Simulation Systems. This tasks supports a Memorandum of Agreement entitled "Training Research Support of Combined Arms Tactical Trainer Development Efforts," signed 24 Feb 93. Parties to this agreement are the U.S. Army Project Manager for Combined Arms Tactical Trainer and ARI. This work is also a portion of research task 2137, Training Analysis and Feedback Aids (TAAF-Aids) for Live Environments. This task supports a Memorandum of Record signed by the TRADOC Combat Training Support Directorate and ARI.

ZITA M. SIMUTIS
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Introduction

The After Action Review Process

The After Action Review (AAR) is the U.S. Army's approach for providing feedback to units after collective training exercises (Department of the Army, 1993). The objectives of the AAR are to decide what happened, why it happened, and how to improve or sustain performance.

Unlike a critique, the AAR is an interactive process in which exercise participants discuss mission planning and execution under the guidance of a trainer (Scott, 1983). The starting point for the AAR is normally a description of the unit's plans for the mission followed by a discussion of what happened during the mission.

The discussions can be guided in part, through the use of information displays illustrating what happened during an exercise. These displays may simply serve the purpose of refreshing the memory of exercise participants, or they may provide a new perspective on exercise events. For example, the graph shown in Figure 1 shows when each vehicle in a tank platoon fired and the result of each firing event (O indicates a miss, X indicates a hit, and K indicates a catastrophic kill). This particular figure shows that one tank did not participate in the engagement, another tank fired many rounds without a single hit, and a third tank had many hits but only one kill. The information in the figure can differ markedly from the group's collective perception of what happened during the exercise.

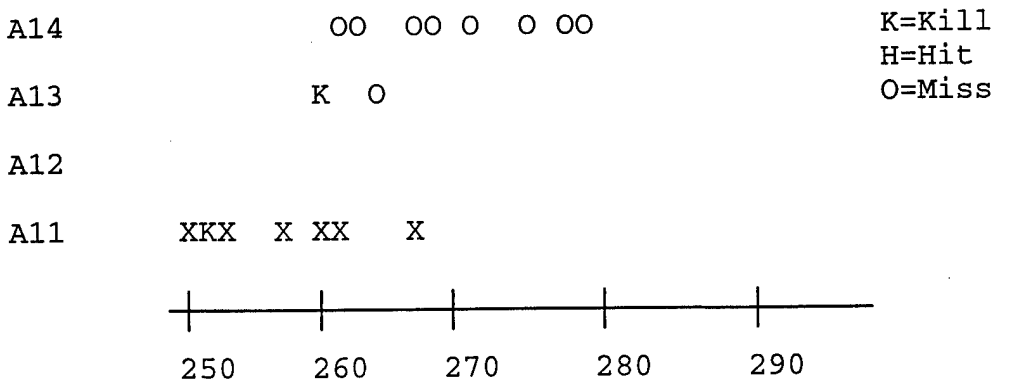

Figure 1. Timing and effects of tank main gun fires, by vehicle.

Application Across Live, Virtual and Constructive Environments

The AAR process is intended to apply to live, virtual, constructive, and mixed environment exercises. A live exercise is one in which operational equipment and actual terrain is used, such as when a platoon maneuvers in its tanks. Virtual exercises involve the networking of simulators to make it possible for crews to interact together on a common terrain database. Information produced by each simulator, such as its location on the terrain database, is transmitted over a network and picked up by other simulators. The graphics generator for each simulator employs network data and data from a common terrain database to provide a current "out the window" view of the world for crew members (Thorpe, 1987). Constructive simulations represent units as an aggregate without simulating each entity within a unit (Stober, Kraus, Foss, Franceschini, and Petty, 1995), and this environment has been used largely to support command and staff training. A synthetic theater of war (STOW) environment contains a mix of at least two types of environments (Sottilare, 1995).

Benefits of Standardizing AAR Aids

Many benefits may be gained by standardizing AAR aids for a particular echelon and unit type. The greatest benefits are gained when the aids are standardized across training environments. Standardizing AAR aids for a particular group does not mean that a specific set of aids will be produced for an exercise regardless of what happens during the exercise. Instead it means that there is a set of predefined AAR aids that a trainer may select among to fit the outcome of a specific exercise. For example, armor platoons may use a data table with a specific format to assess or illustrate the quality of fire control during defensive missions. If poor fire control or exceptionally effective fire control contributed to the outcome of the exercise, a trainer may use the data table during the AAR. If the trainer wants to focus on other points during the AAR, there is no requirement to use the data table. The benefits of AAR aid standardization are discussed below.

Reduces total resources required to produce an AAR. When the proponent for a particular unit type and echelon has decided upon the aids and aid features useful to that group, it becomes possible to write software that relieves many tedious tasks from the shoulders of trainers. Such software may even include the application of artificial intelligence to automatically reduce the number of candidate AAR aids to those likely to be of interest, given a specific outcome.

Provides the potential to reduce software development costs. From 1994 through 1997, at the request of the Project Manager for Combined Arms Tactical Trainer (PM-CATT), ARI hosted an annual AAR Conference. One of the key reasons for this conference was to alert proponents for AAR systems to the duplications in the capabilities of existing AAR systems. The effort to develop a standardized set of AAR aids within each unit type and echelons can provide the information needed by engineers to decide whether it is feasible to design one or two AAR systems that can meet the needs of all proponents.

Links all collective training exercises with capstone events. A major benefit of standardizing displays across environments is that it links exercises with capstone training environments, such as rotations to a combat training center (CTC). If a CTC employed a particular data table to show how well a particular unit performed resupply operations, units would want to see the same table after participating in live, virtual, or live exercises at home station. Performance feedback at CTCs has a high degree of credibility, and we want to standardize AAR aids in manner that capitalizes on this credibility.

Ensures aids are readily interpretable. Standardization is also expected to help ensure that AAR aids will be immediately interpretable to exercise participants. If many minutes are required to explain what an aid means then it will be of little or no value in the training environment. Standardizing of AAR aids within echelons and across environments helps to make sure that exercise participants will be familiar with the aids used in AAR sessions.

Can help ensure training is task-based. To the extent that AAR aids assess the outcome of task performance, they also ensure there is a task-oriented focus to the AAR. For example, the standard for the armor platoon task "execute a column formation" is "the platoon executes the column formation without delay and without stopping movement." AAR aids that illustrate a unit took too long to change to the column formation, came to a stop when changing formations, or moved in a formation that does not fit the definition of a good column formation help to focus the AAR on task execution.

Purpose of Guide

The Standardized Army After Action Review System (STAARS) program includes the goal of providing a standard set of AAR products for specific unit types and echelons that can be applied across the L/V/C and STOW environments (Department of the Army, 1996). This document provides guidance for implementing this

goal. In addition to describing the benefits of standardizing AAR aids, this guide:

- describes general types of AAR aids and selected variations in g the way the various types have been implemented;
- clarifies the concept of AAR aid standardization;
- discusses the utility of each type of aid;
- presents a technique for defining a standardized set of AAR aids for a specific unit type and echelon; and
- describes the importance of having an AAR editing capability to reduce potential problems in standardizing AAR aids.

Types of AAR Aids

Ground Truth Displays

Ground truth displays illustrate actual exercise events. This section of the document provides a description of general types of AAR aids. More detailed descriptions of specific implementations of various types can be reviewed to see how the design features of the aid (the specific way in which the aid type is implemented) may have to be modified to assist in examining specific aspects of performance (National Simulation Center, 1997b; Fernan and Dryer, 1994; Meliza, Bessemer, Burnside, and Shlechter, 1992; Meliza and Tan, 1996; Shlechter, Bessemer, Rowatt, and Nesselroade, 1994). For example, an early version of an AAR system included the ability to replay vehicle movement and firing events on a moment by moment basis over a grid map without terrain features. This type of aid (called a two dimensional animated replay) worked well for examining certain aspects of performance, but examining other aspects required information about the terrain situation. Therefore, the AAR system was modified to allow the two dimensional animated plan view to "show" or "hide" terrain features at the option of the user. ***An important part of the job of standardizing AAR aids is identifying the design features that need to included for each general type of aid.***

In many cases, more than one type of display can be used to illustrate the same event. In general, the best display to use for a particular purpose is the one that makes a point most efficiently at a specific point in time. Efficiency is determined, in part, by inherent differences among aids in terms of the time required to illustrate a point (e.g., a table showing how many times each vehicle fires during a fifteen minute engagement can quickly make the point that only a few vehicles were involved in the engagement, vice watching a replay and trying to keep track of which vehicles fired). Efficiency is also determined by the overall mix of AAR aids employed. If a trainer can make a series of points using a single type of AAR aid, this may be preferable to jumping from one type of aid to another. ***An important part of the job of standardizing AAR aids is considering the speed with which type of aids can be used to make specific points. Another important part of the job is to consider the variety of aids that can be used to make a particular point to provide trainers with the capability to use the aids that are most effective in a particular session.***

Two dimensional (2D) animated plan view replay. This aid shows a 2D replay of exercise events over a map display with unit control measures marked. Icons may be used to represent individual entities (usually vehicles) or they may represent a unit (e.g., platoon). At a minimum, these displays show movement of entities or units. They may also show indirect fire impacts, firing of individual vehicles, the status of individual vehicles (alive, damaged, or destroyed), vehicle orientation, and gun tube orientation. Animated plan view replays are commonly used in the live, virtual and constructive environments.

The 2D replay may also provide the synchronized replay of tactical communications. It may also show when line-of-sight exists among friendly and enemy forces and when entities are employing protective measures (e.g., aircraft using flares). This list of information that can be shown in 2D displays is not exhaustive. Additional types of information may need to be included to examine particular aspects of unit behavior.

2D replays can be conducted at normal speeds (one minute of replay covers one minute of exercise time) or at speeds much greater than normal (e.g., one minute of replay covers six minutes of exercise time). Replays can also be paused to allow viewers to study an activity in greater detail. Many replay systems also provide the capability for users to jump directly forward or backward from one point in time to another.

Snapshots. Snapshots fall into two general types. One type of snapshot simply captures the contents of an animated 2D display at a specific point in time. Figure 2 is an example of such a display, and it shows the movement formation and dispersion of a platoon at the time it was first engaged by the enemy. The other type of snapshot may provide information not contained in the animated 2D. Because the snapshot is a static display, additional information can be added without cluttering the display. Figures 3 and 4 illustrate how new types of information may be added to a snapshot to support training points. In this case, one tank from a platoon engages the enemy for several minutes without assistance from the remainder of the platoon. The snapshots help to explain why the rest of the platoon was not involved. These figures indicate where line-of-sight (LOS) exists between vehicles immediately before Tank D engages the enemy (a solid line indicates LOS, while a dashed line indicates non-LOS). Figure 3 shows that Tank D has LOS with three of the four enemy tanks, but does not have LOS with any of the other vehicles in its platoon. Figure 4 shows that Tanks A and B do not have LOS with any of the enemy vehicles.

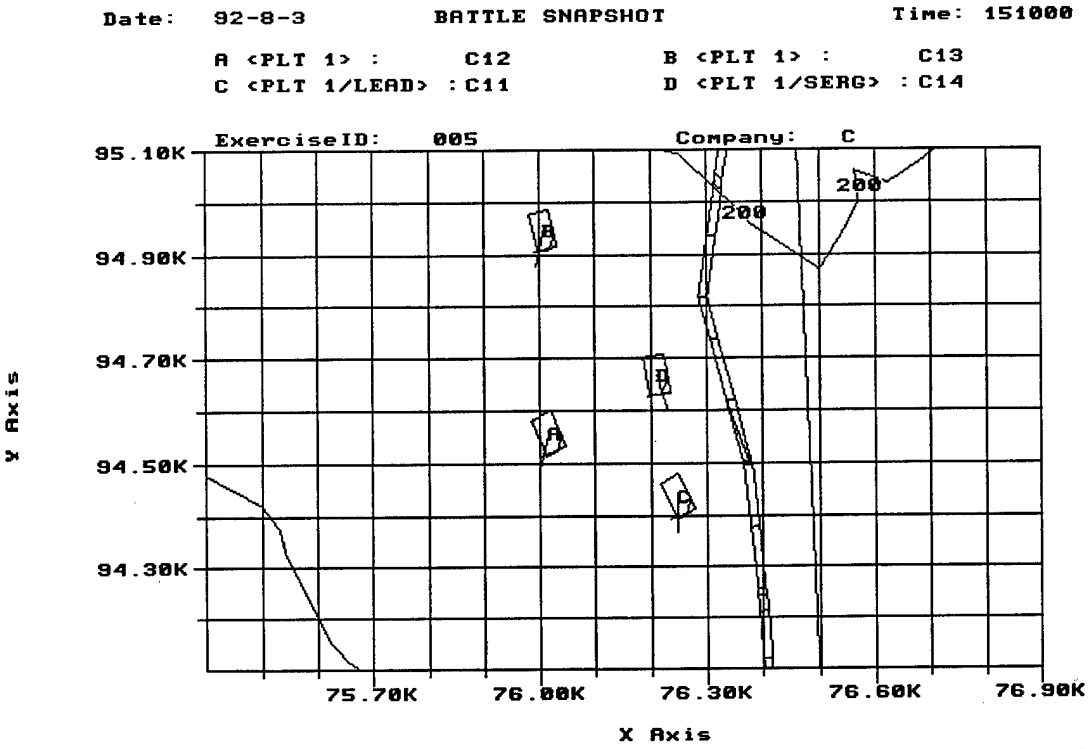

Figure 2. Snapshot showing platoon formation when contact made with the enemy.

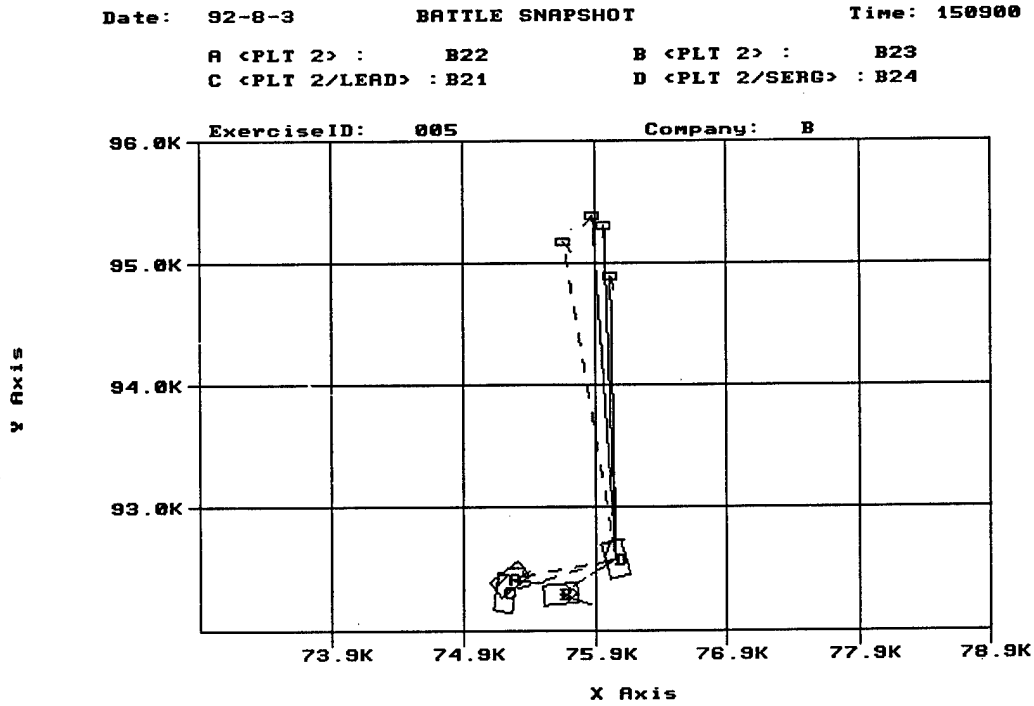

Figure 3. Snapshot showing tank D has LOS with three enemy tanks.

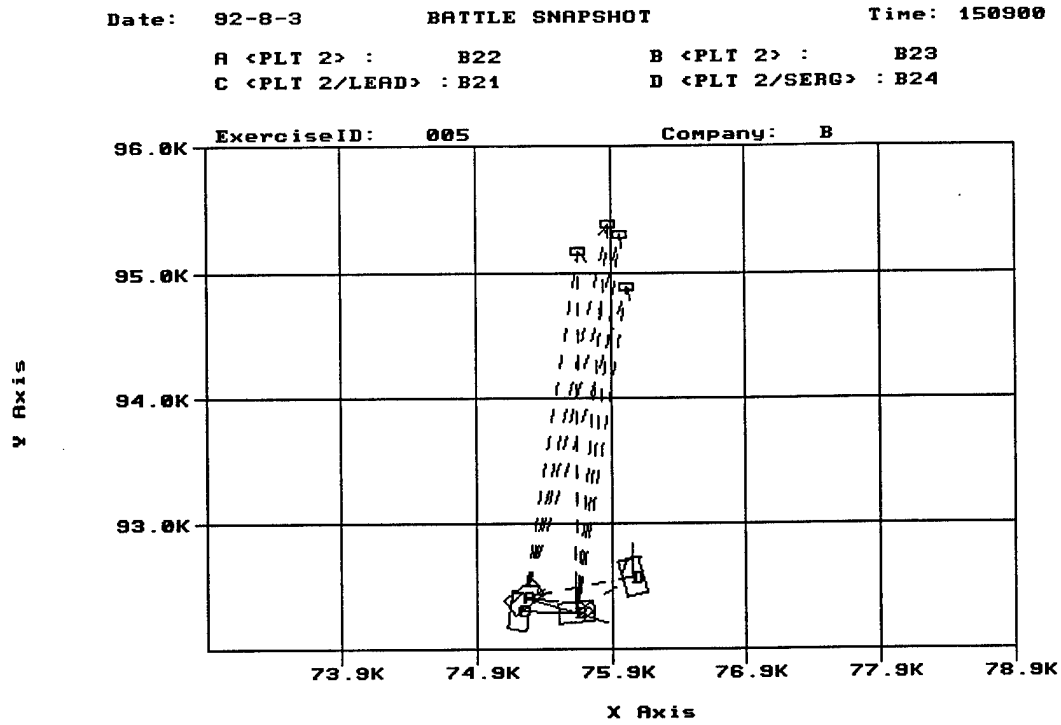

Figure 4. Snapshot showing lack of LOS among tanks A and B and enemy vehicles.

Battle flow. The battle flow display is another version of the 2D display. A battle flow display or "snail trail" provides a trace of the movement of individual vehicles or a unit. The trace is provided over a map display, and locations of vehicles may be marked at specific intervals (e.g., every five minute). The major use of a battle flow display is to illustrate problems in navigation such as wandering and backtracking. The advantage of a battle flow display over an animated plan view is that one "picture" can immediately show a navigation problem rather than having a unit watch a replay for several minutes. Figure 5 is a battle flow display tracing the movement of three tanks from one battle position to another over a period of roughly fifteen minutes.

At one point it was believed that battle flow displays provided a means of assessing unit formations during movement (e.g., do move abreast throughout an assault, or are vehicles adequately dispersed during a lengthy movement?). Unfortunately using battle flow displays for these applications requires that position updates be provided by each vehicle at exactly the same time, which is rarely the case. Further certain applications require update rates that are more frequent than can be supported by simulations or communications bandwidths.

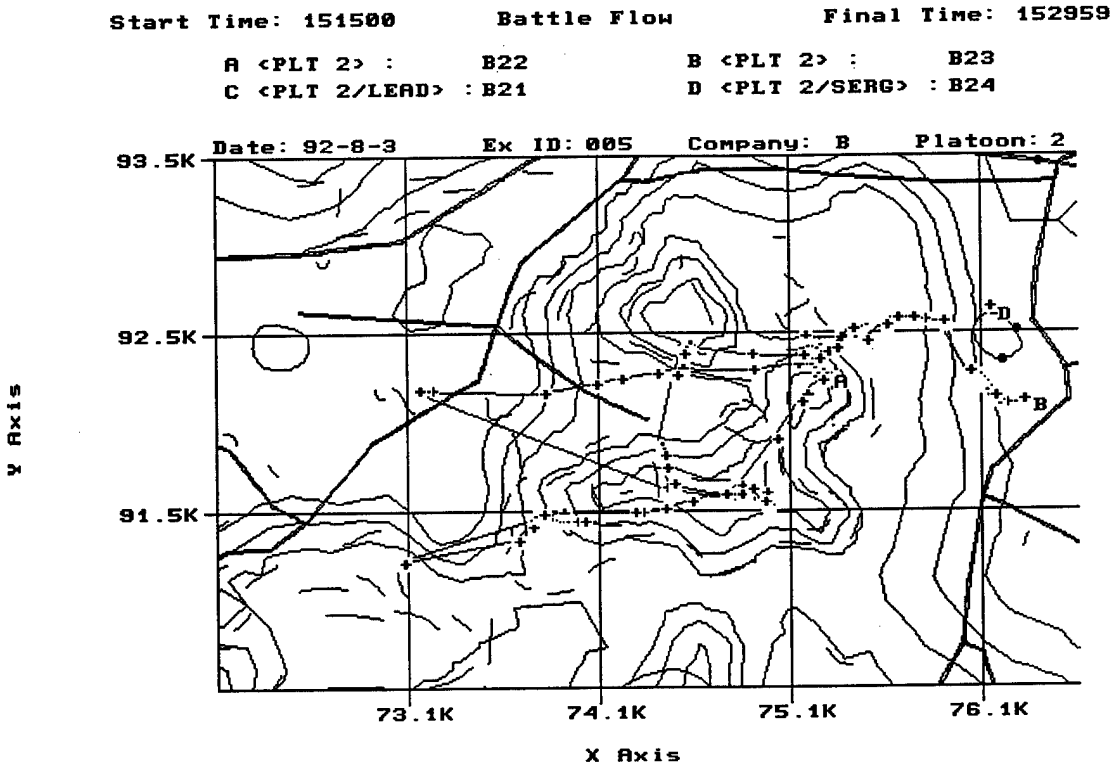

Figure 5. Battle flow display tracing paths of three tanks withdrawing to an alternate battle position.

Fire fight displays. The fire fight display is another version of the 2D display. The purpose of the fire fight display is to show where direct and indirect fires impact over a period of time selectable by the user. Instead of individual round impacts being briefly shown as they are with the 2D replay, the fire fight display aggregates impacts over time. If one wants to see where fires are and are not being placed, the fire fight display can provide this information immediately. At a glance, a unit can see, for example, whether they fired only within their assigned sector. Figure 6 provides an example of a fire fight

display in which direct fires are shown by shot lines showing the location of firing entities and the location of round impacts.

One early implementation of the fire fight attempted to employ color codes to convey information about the results of each direct fire event (Meliza and Tan, 1996). This approach did not work well, because one shot line would tend to hide another.

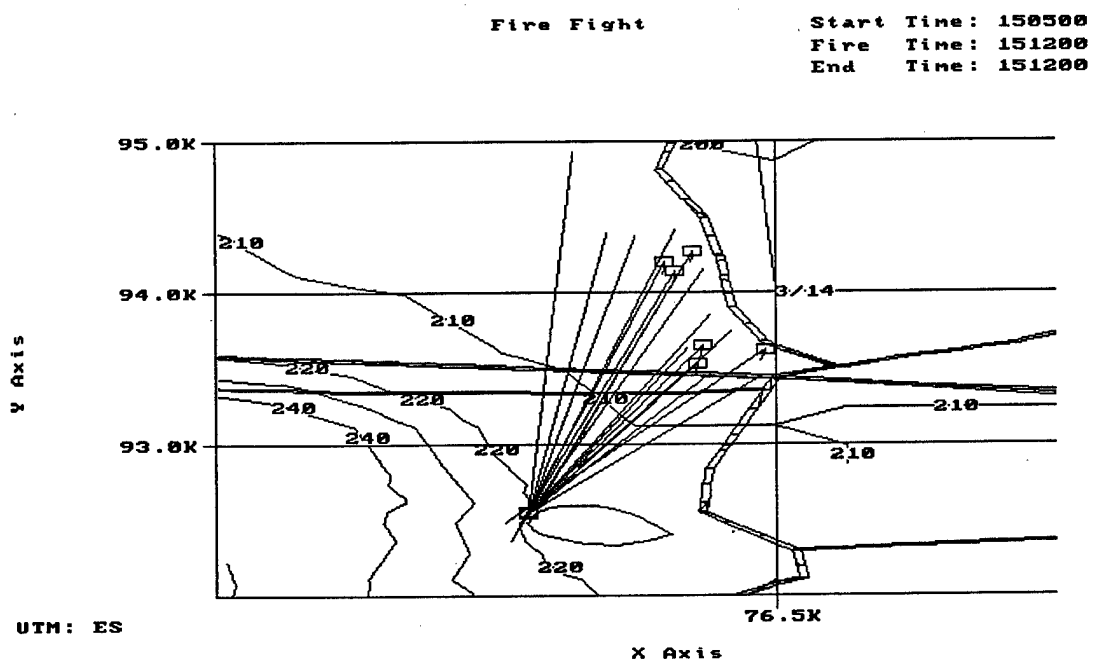

Figure 6. Fire fight display showing location of firer and impacts of rounds over time.

Range fans. Range fans are static 2D displays that show areas that could be covered by a unit's direct and indirect fires. This type of aid is most appropriate for a defensive mission. A number of examples of range fans are contained in a report by Fernan and Dryer (1994).

Video clips. In all environments, video clips may be used to capture face to face interactions among personnel (e.g., issuing an operations order), interactions of individuals with machines, or the contents of computer screens as a function of time. The last two applications of video clips have become more important with digitization of the battlefield and the advent of the Applique and other visually-based digital communications systems.

The current major use of video clips is in the live environment where videos can be made to show what a unit's

actions looked like from the enemy's perspective, what actions a unit performed while preparing to execute a mission, and what the threat situation looked like from a unit's perspective. Used in this way, the video clip serves substantially the same function as the three dimensional view described below does in virtual exercises.

The use of video clips for AAR sessions present certain logistical problems. The first problem concerns scheduling the creation of a video. The trainer must anticipate a significant event and make arrangements to have personnel available at the appropriate site and time to create the video. The second problem concerns editing the video so that it can be used to make a point without exercise participants having to wait while a trainer fast forwards through a video to reach an event of interest.

Three dimensional (3D) animated replays. The 3D animated replay, like the video clip, is an out the window view of an exercise that may be employed in the live, virtual, or constructive environments. The 3D replay uses an electronic data stream (data on movement of entities or units, and data on firing events) to create a virtual view of an exercise. This replay capability can be used in any environment in which an electronic data stream is available to implement the 3D view.

In effect, the 3D animated replay covers only a portion of the activities that can be shown using video clips. For example, the 3D replay is not appropriate for showing interactions among humans and man/machine interactions (unless the training environment creates virtual views of humans). An advantage of the 3D view is that it allows an "out the window" view of the battlespace to be created instantaneously from any point/ perspective in the battlespace. The 3D view is often referred to as the "stealth" view, because a trainer can observe the action from any perspective during an exercise without being seen by participants.

Tables and graphs. These displays can be used in all environments. The data used to prepare these displays may come from instrumented systems that automatically collect exercise data, and/or they may be based upon observations of behavior made by trainers or data collectors. Figure 7 provides an example of a graph showing the number of rounds fired by four platoon vehicles as a function of time. In this case the platoon as a whole was involved in two different engagements over a thirty minute span. Three platoon vehicles participated in the first engagement, and two participated in the second. One of the platoon vehicles did not fire during either engagement. During the first engagement, one of the vehicles engaged the enemy for

five minutes without assistance from the remainder of the platoon.

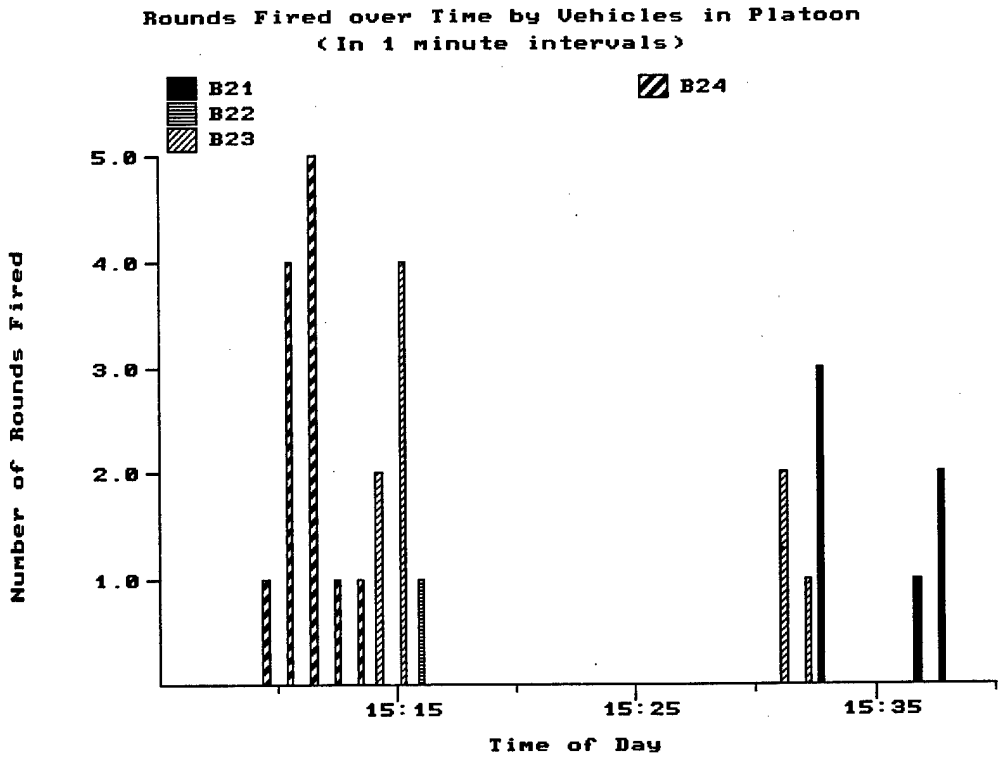

Figure 7. Graph showing contributions of each of four tanks to engagements during two periods of contact with enemy forces.

For certain aspects of unit performance, graphs and tables provide the fastest way to illustrate a point. For example, consider a case where a trainer wants to make the point that only two of the four vehicles in a platoon were involved in an engagement that lasted ten minutes. The trainer may fast-forward through a replay of the engagement, leaving it to exercise participants to individually keep track of who is firing and who is not. Alternatively the trainer may use a table providing the number of rounds fired by bumper number, showing that only two vehicles fired.

A weakness of tables and graphs is that they do not provide information about terrain, friendly situation, and enemy

situation variables shown in other types of displays. Additional information is often needed to help interpret the information in tables and figures and to support follow-on discussions necessary to diagnose the cause of a problem.

Exercise timelines. Exercise timelines show when events occur during an exercise. They may be based upon data that are automatically collected electronically, and/or they may be based upon behavioral observations. A commonly used timeline based upon behavioral observations is one showing when leaders at various echelons issued their orders relative to the time a unit executed its mission. It is used in deciding whether units follow the guidance to take no more than one-third of the time between receipt of their orders and mission start time to develop and issue orders for the next echelon.

Behavioral checklists. AAR aids may also include displays that show whether a unit met standards described in doctrine, but a trainer taking this approach needs to be prepared to defend ratings. To the extent that the ratings are based upon observations of the occurrence/non-occurrence of specific events (e.g., the leader did or did not conduct a backbrief after issuing an order), defending a rating is less likely to be a problem. Further, if the checklist is used to help a unit diagnose a problem that has already been identified, one can expect the unit to be more accepting of ratings.

One should also keep in mind that a checklist can also be completed by a unit during the AAR. For example, a trainer may show a checklist that has not been completed to a unit and ask the unit which standards they feel they met. A trainer may also put up a blank piece of paper and ask a unit to make a list (e.g., "if you were to repeat this mission, what would you do differently the next time?)"

"How to Fight" and "How to Train" Guidance

Displays can also be used to support AARs by describing alternative courses of action and by describing training strategies that can be used to improve or sustain performance. These displays may be important in helping a unit decide why a performance problem occurred and in identifying potential corrective actions.

These displays may take the form of text or figures from "how to fight" guidance describing tactical doctrine for performing a mission or task. Many examples of "how to fight" displays are provided in Appendix J of Brown et al. (1998).

"How to fight" guidance may even take the form of ground truth data from past exercises. For example, if a unit had trouble placing direct and indirect fires on the enemy, a trainer might show a fire fight display or animated 2D replay from an exercise in which a unit was able to quickly mass fires on enemy positions.

The Standard Army After Action Review System (STAARS) Concept Regarding Standardized AAR Aids

The Operational Requirements Document (ORD) for the Standard Army AAR System (STAARS) identifies the need to "provide high quality standardized AAR products appropriate to the echelon(s) being trained or analyzed" (National Simulation Center, 1997a). STAARS is intended to be applied across the live, virtual, constructive, and STOW environments. The standardized products generated in or across these "environments will be identical, or nearly identical, and appropriate for each echelon receiving an AAR." A review of the STAARS ORD provides clarification of the concept of standardized AAR aids.

Insures a Minimum Set of AAR Aids Can be Automatically Provided to Support AARs Across Environments

One should not interpret the STAARS ORD as limiting the AAR products that can be used by a particular unit type or echelon. Instead, standardization of products is intended to make sure that a certain minimum set of AAR products can be made available while minimizing the effort required to prepare these aids. STAARS includes a three-tier concept. Tier I will use an expert system to "provide automated, standardized AAR products connected to the commander's Mission Essential Task List (METL) for training events and Exercise Objectives." Tier II will include additional AAR products that can be selected from a menu, and Tier III will give users the ability to create custom AAR products and enable these new products to be added to the Tier I and II implementations.

Requirement for Standardized AAR Aid to Fit Every Environment is not Absolute

Standardized AAR products are not limited to those that are supported by all training environments. The STAARS ORD points out that standardized displays may be modified, or new standardized products created "to take advantage of the superior ability of a particular LVC or STOW environment to support training or evaluation of certain types of training objectives."

Various environments offer distinct advantages in terms of their ability to provide an opportunity for practicing particular collective tasks and/or to provide precise feedback. For example, the virtual environment offers certain advantages over the live force-on-force environment in training fire distribution and control tasks, because an electronic battlefield makes it possible to know where every round impacts. Given the location of round impacts, it is possible to construct a fire fight aid

like Figure 8, showing where the fires of two platoons are being distributed.

There is a second reason for capitalizing on the strengths of specific environments by providing aids that are currently supported by only one or two environments. Future exercises may involve innovative blending of the three environments to increase the effectiveness and efficiency of training. For example, Figure 8 came from a recent study suggesting how the use of an engagement model, based upon virtual algorithms, running currently with force-on-force live engagements can be used to enhance the quality of information available to support AARs (Brown, Nordyke, Gerlock, Begley, and Meliza, 1998). In this case, casualty assessments would continue to be based upon engagements simulated with the Multiple Integrated Laser Engagement Simulation System (MILES), but the virtual algorithms would be used to provide information about where rounds that miss the target impact. To enable this capability, vehicles would need to be instrumented to provide information about the gun tube azimuth, gun tube elevation, and type of ammunition fired for each firing event.

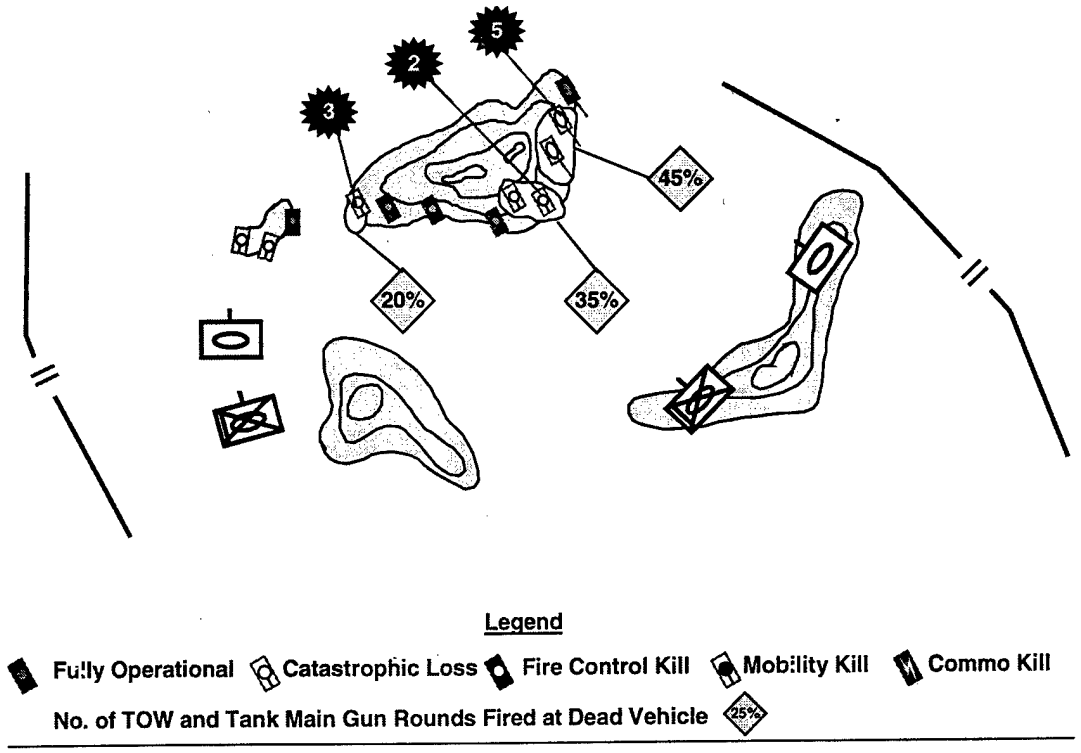

Figure 8. Percentage of friendly fires falling with various footprints, showing portions of the enemy force not engaged.

Standardization Includes Defining the Tactical Events Marking or Bounding the Period Covered by Each Aid

STAARS will "automate the production and nomination of candidate AAR aids by providing expert logic aids for linking exercise objectives to data collection and allow the trainer to select aids relevant to a specific exercise" (National Simulation Center, 1997a). For a system to automatically generate AAR aids, it must know what type of aid to produce and the time period to be covered. In a few cases the time period covered will be bounded by the start of the exercise (STARTEX) and the end of the exercise (ENDEX), but in most cases periods will be bounded by tactical events. For example, a video clip from the enemy's perspective can begin when a moving platoon first has LOS with the enemy and end when the first shot is fired. Such an aid would provide a useful illustration in cases where the platoon was using a movement technique that made it especially vulnerable to the enemy and resulted in rapid destruction of the platoon by enemy fires. In a case where the video clip did not illustrate a significant aspect of performance (e.g., the platoon moved to a battle position as soon as it established LOS with the enemy and twenty minutes passed before either side opened fire), the trainer would not be required to use the clip for an AAR.

The job of defining the aids to be automatically generated by an exercise is made somewhat complex by the fact that no one knows what the nature and timing of tactical events will be until a particular exercise is over. Consider a case where one is designing an AAR aid with the objective of illustrating how well or poorly a moving platoon reacts to enemy contact. The types of behaviors of interest include reporting to higher headquarters, using fire to destroy and suppress the enemy, and use of cover and concealment. A video clip or 3D view with synchronized replay of radio communications can be used to illustrate these behaviors (or their absence), but what tactical events should decide when the replay begins? "Contact" with the enemy may be defined as: the first enemy direct fire against the platoon; the first platoon direct fire against the enemy; the platoon receiving enemy indirect fire; the platoon reporting contact to higher headquarters; a crew reporting contact on the platoon radio net; the platoon leader ordering a contact drill or action drill; or visual contact is established between the platoon and the enemy force. If the designer of the aid chooses the platoon reporting contact as the trigger, and the platoon is destroyed before reporting contact, no aid will be produced. Similar problems exist with using the other events in isolation as triggers for starting the aid. The solution is to tell the system to start the aid whenever any one of these tactical events first occur (Brown, Wilkinson, Nordyke, Riede, Robideaux, and Huysson, 1995).

Standardization Involves Identifying Relevant Mission, Enemy, Terrain, Time, and Troop (METT-T) Variables

This aspect of standardization is concerned with deciding what information needs to be included in specific types of aids, and it is concerned with identifying changes in the tactical situation that need to be automatically recorded by the system or recorded by an observer. For example, adding LOS displays to a plan view can make it possible to decide which friendly vehicles have LOS with which enemy vehicles at a specific point in time. Alternatively, a system can be programmed to automatically assess and record when any friendly vehicle first has LOS with an enemy vehicle.

Applying standards to measure the performance of collective tasks requires attention to the specific METT-T situation under which a task is performed (Kerins, Atwood, and Root, 1990). If one wants to assess the quality of a platoon's movement or the adequacy of battle positions it is difficult to do so without having information about the terrain situation and the suspected location of enemy forces. This information about the METT-T situation is used to decide when certain courses of action are required on the part of a unit, and they are used to decide if the course of action has been correctly executed (Did the unit's actions successfully influence the situation?).

The importance of the METT-T situation in determining which AAR aids are relevant to an exercise can be illustrated by a recent attempt to describe how the diagnosis of unit performance might be automated in the Close Combat Tactical Trainer (CCTT) environment. McCarthey (1997) described how the electronic data stream from the exercise could be used to decide what courses of action were appropriate and measure how well actions were performed for an exercise in which one mechanized infantry platoon and one tank platoon provide supporting fires for the assault of a third platoon. A review of this work shows that there are at least thirty different METT-T conditions that influence what a unit should do and/or or provide a means of measuring the quality of unit performance (e.g., after repositioning "the support by fire force can identify more vehicles than previously").

Standardization Can Also Apply to Aids Providing "How to Fight," and "How to Train" Information

Standardization of AAR aids is not necessarily limited to those aids based upon events from the exercise proceeding the AAR. Standardized products may include aids that present alternate courses of action, such as excerpts from tactical doctrine, magazine articles, and aids showing data from successful exercises.

"How to Fight" AAR aids are already being used in standardized fashion within the live, virtual, and constructive environments. In recent visits to the Army's Combat Maneuver Training Center, Joint Readiness Training Center, and National Training Center the author found that observer/controllers (O/C) and analysts maintained electronic and paper-based libraries of AAR aids used to describe "how to fight" information (Brown et al., 1998). OCs selected the aids for a particular exercise based upon their diagnosis.

The author also observed paper-based libraries of such aids being used for AARs after simulation networking (SIMNET) exercises. A problem noted by trainers in reviewing an AAR system for this environment was that it did not provide a means of displaying "how to fight" aids (Meliza and Brown, 1996). Demonstrations of the constructive Corps Battle Simulation (CBS) and Vision XXI AAR systems at AAR conferences have shown that these systems include the capability to store and display libraries of "how to fight" data.

The STAARS ORD states that the AAR system should "provide the capability to compare unit performance to doctrinal standards and lessons learned from other training events." The STAARS ORD also states that the system should allow the user to "modify briefing slide templates; access and integrate portions of previous AARs; and add modify or delete libraries of graph, test and figure displays and create custom displays."

Functions of AAR Aids and Types of Aids Supporting Each Function

All AAR aids can serve a number of functions, but certain types of aids do a better job than others of supporting a specific function. The major functions of AAR aids and the types of aids supporting each function are described below.

Help AAR Leader Diagnose Unit's Performance Problems in Preparation for the AAR

AAR aids can be used by an AAR leader prior to the conduct of an AAR to diagnose the strengths and weaknesses of a particular unit. These aids are used to supplement any information the leader may have gained by observing the unit's performance during an exercise.

The goal of the AAR leader is to go beyond identifying problems in the exercise outcome to the point of finding out what caused the outcomes. The AAR leader should also be concerned with defining the link between outcomes and causes so that the unit will be motivated to correct the problem. In defining this link, the leader diagnoses performance in increasing levels of detail. For example, a company team failed to take an objective, because two platoons were destroyed by enemy direct fire. The assault element was destroyed, because the artillery fire intended to suppress the enemy was not at the correct location. The fire was at the wrong location, because there was no attempt to adjust fires.

The types of aids useful for post-exercise diagnosis are those that can be quickly screened to identify problems in unit performance such as data tables, graphs, exercise timelines, battle flow displays, fire fight displays, and range fans. The term range fan is used here to cover a variety of utilities that have been developed to show how well the positions occupied by individual warfighting components enable the unit to observe and fire on the area of operations.

One of the most valuable aids for diagnosing performance are the checklists used by trainers in observing the performance of key leaders. One of these lists, for example, can address the actions a platoon leader should take when preparing a platoon for a mission and include such actions as asking questions of subordinates to make sure they understand the mission. In many cases, a trainer may anticipate outcome problems due, for example, to a unit leader's failure to designate responsibility for performing a task to a specific crew or individual. If these outcome problems subsequently occur, the AAR leader will have already identified a chain of causality.

Illustrate or Document Performance Problems

The AAR process begins to fall apart if units do not recognize that performance problems exist, and an AAR leader's comments about unit performance (e.g., "the platoon did not move fast enough") are often not sufficient to cause a unit to acknowledge a problem. If an AAR leader can illustrate or document a problem (e.g., "in this replay you can see that you crossed Phase Line Zebra at 0612, and at what time were you supposed to cross Zebra?"), a unit is more likely to accept that a problem exists.

The documentation function can be served by 2D replays, video clips, 3D replays, data tables, graphs, timelines of exercise events, battle flow displays, fire fight displays, replays of radio communications (perhaps synchronized with 2D or 3D replays or video clips), and range fans.

Refresh Memories of Exercise Participants

AAR aids can be used to refresh the memories of exercise participants by recreating the situation experienced by unit members during an exercise (e.g., "this is the terrain situation faced by your moving platoon when it first received enemy fires"). The aids used for this purpose should match what the unit saw and heard during the exercise. The aids supporting this function include video clips showing activities from the perspective of the unit being trained and 3D replays of exercise data appropriate to the virtual format. Replays of tactical radio communications (perhaps synchronized with video clips and 3D replays) can also be used to refresh the memories of exercise participants. Finally, descriptions of the unit's orders or planning documents can help to refresh memories of participants regarding the unit's goals and planned approach.

Provide New Perspectives on Exercise Events

AAR aids can also be used to provide a new perspective regarding what happened during an exercise (Meliza, 1997). An example of providing new perspectives would be using a replay to show a platoon that the "enemy force" they briefly and unsuccessfully engaged was the rear element of a friendly company team. The types of AAR aids supporting this function include two dimensional replays from a plan view, video clips or 3D replays from the perspective of the enemy, data tables, graphs, timelines of exercise events, battle flow displays, fire fight displays, replays of radio communications, and range fans. That is, all of the aids for providing ground truth data can be used to provide new perspectives.

Help Units Examine Alternative Courses of Action

AAR aids can also be used to provide information from outside a particular exercise that helps to diagnose problems in unit performance or point out corrective actions. "How to fight" and "how to train" AAR aids address this function. Using the AAR process to help a unit identify action items necessary to improve or sustain performance is a challenging responsibility. Recent research by Gubler (1997) found that very few AARs produced specific training solutions to identified problems in unit performance. Clearly, additional research is needed to decide how to best use AAR aids to address this need.

Encourage Participation in the AAR and Press Unit Members to Identify Problem Causes and Potential Solutions

The AAR process simply does not work unless unit members participate in discussions. One of the most commonly used aids for soliciting participation in the AAR are AAR orientation slides used at the beginning of the AAR. Such slides may simply state that "this is your review of your unit's performance and I am here to support your review process."

The next most commonly used aids is probably a map display of the area in which the exercise was conducted containing the unit's control measures. The AAR leader often asks the unit leader to start the AAR by using the display to describe the unit's plan for the operation. Another commonly used type of aid is created on the spot when an AAR Leader creates a list of responses to questions such as "what issues do you want to cover during your AAR" or "what do you think was your unit's greatest weakness (or strength) during this exercise." Another commonly used aid is a model of the terrain on which the exercise was conducted with "toy" vehicles that unit members can use to show what happened in the exercise.

Motivating and cueing unit participation in an AAR is a difficult task. A recent review of platoon and company level AAR tapes from maneuver combat training centers showed large differences among AAR sessions in terms of: the relative amount of talking done by the AAR leader versus the unit; the number of problems or corrective solutions identified by the AAR leader versus those identified by the unit; and the percentage of the unit that participated in the AAR (Gubler, 1997). Only four of the seventeen sessions examined demonstrated a high level of participation by unit members. This research also involved looking for relationships between the actions of AAR leaders and the level of participation. One AAR-aid related factor associated with a high level of participation was the use of battle damage assessment (BDA) data. Unfortunately we still know

very little about how specific types of AAR aids influence the level of participation of unit members.

In certain cases unit members may do a lot of talking during the AAR without identifying causes of problems or corrective actions. One of the techniques used to push unit members into identifying specific causes and corrective actions is to ask members of the unit such questions as "if you were just starting the last exercise what would you do differently this time", and then prepare a list of responses for all to view.

Summarize and Document the Results of the AAR

The summary of the findings during the AAR may be provided by the AAR leader or they may be provided by unit members in response to questions from the AAR leader such as "what do you think your highest priority action items should be in preparing for future exercises?" In many cases the AAR leader may know what he wants the unit to discover during the AAR and prepare appropriate slides before the start of the AAR.

Table 1 provides a summary of AAR aid functions and types of aids associated with each function.

Table 1.

Major Functions of After Action Review (AAR) Aids and Types of Aids Supporting Each Function

Functions	Types of Aids
Help AAR leader diagnose problems in preparation for the AAR	Behavioral checklists, tables, graphs, battle flow displays, fire fight displays, range fans, exercise timelines.
Refresh memories of exercise participants	3D replays and video clips from unit's perspective, radio communications, terrain models, unit plans
Provide new perspectives on exercise events	3D replays and video clips from enemy's perspective, 2D replays, tables, graphs, battle flow & fire fight displays, range fans, radio communications synchronized with 2d replays exercise timelines, behavioral checklists
Illustrate or document performance problems	2D or 3D replays, video clips, tables, graphs, battle flow & fire fight displays, range fans, exercise timelines radio communications (synchronized with replays)
Help unit members examine alternative courses of action	Behavioral checklists; excerpts from tactical doctrine, journals, magazines; Illustrations of performance from successful exercises; Lists generated by participants
Encourage participation and push unit to identify specific problem causes and potential solutions	Lists generated by participants, terrain models, 3D sand tables; tables showing battle damage assessments
Summarize and document results of the AAR	Lists generated by participant input or by leader

Techniques for Defining a Standardized Set of AAR Aids for a Specific Unit Type and Echelon

One of the biggest obstacles to having proponents define standardized AAR products for specific unit types and echelons is that few units have significant experience using AAR aids. Even at the maneuver CTCs, for example, the AAR aids available at platoon and company level are largely of the type that describe alternative courses of action (e.g., excerpts from manuals) rather than the type that provide information about the actions of the unit during an exercise. At present we lack the personnel resources and automation capabilities needed to provide exercise-based AAR aids in a timely fashion. When we consider the virtual world represented by SIMNET or CCTT, we find that the typical AAR aid is an exercise replay from a 3D or 2D perspective. Even basic statistical displays showing who shot whom are rare.

The STAARS AAR Handbook (National Simulation Center, 1997b) provides examples of AAR products based on those used currently for CBS and Brigade Battle Simulation (BBS) AARs. In addition to describing and illustrating each aid, the handbook describes how the aid would be used, describes the general data sources used to prepare the aid, and identifies echelons for which the aids would be appropriate (e.g., Brigade and higher). One approach to defining the standardized AAR products for a specific echelon and unit type is to begin with examples in the handbook and decide how the aid can be tailored to fit your unit.

This current report suggests an alternative approach focusing on the tasks to be trained by specific unit types and echelons. It is less sensitive to the effects of lack of experience with AAR aids, because the information requirements are developed before the issue of specific AAR aid types arises.

Step One: Decide what actions needs to be illustrated to support application of specific task standards

The first step in this process is to describe the unit actions to be illustrated by AAR aids. These actions may be stated in a positive or negative manner. For example, the actions may describe what the unit should do (the unit arrives at control measures on time), or they may describe problems in performance (unit movement is slowed by frequent halts).

Mission Training Plan documents are often a good source of information about positive and negative actions appropriate to a particular unit. The examples in Table 2 from the Mission Training Plan for tank platoons (Department of the Army, 1988). Other sources of information include reports from the Center for Army Lessons Learned.

Table 2.

Actions to be Illustrated When Applying Task Standards for Sample Armor Platoon Tasks

Task/Standard	Actions
Execute a Column Formation/ The platoon executes the column formation without delay & without stopping movement	Formation change takes too long Vehicles stop moving when changing formations Collisions or near collisions Formation does not fit definition of column in terms of spatial relationships & distances
Occupy a Platoon Battle Position/ The platoon moves to the assigned BP, completes the deliberate occupation, and reports established at or before the "defend NLT" time given in the OPORD. Coordination with adjacent platoons is conducted, conflicts are resolved, and changes to the platoon's plan resulting from the coordination are disseminated.	Unit does not move to assigned BP Unit does not report occupation completed by NLT time Gaps in fields of fire or observation between platoons Gaps in platoon'scoverage of its assigned sector Positions offer poor cover and concealment
Process Enemy Prisoners of War/ The platoon utilizes the five "S's" in processing enemy prisoners of war (EPWs) for evacuation to the next higher headquarters' EPW holding area within 6 hours of capture.	Unit late moving EPW to rear Critical information is not provided by reports or tagging of EPWs (number captured, date and time, grid coordinates, & circumstances) EPW are not segregated.

Step Two: Identify Marking or Bounding Tactical Events

The second step in identifying a standard set of AAR aids is to decide what tactical events mark or bound the period covered by displays. In certain cases, an aid will be based upon the situation that exists at a specific point time associated with the occurrence (or marking) of a tactical event. In other cases, the period will cover a span of time and be bounded by the occurrence of two tactical events. Table 3 shows tactical events that can be used to mark or bound the time periods relevant to the actions shown in Table 2.

Consideration of marking and bounding events helps in identifying the types of aids appropriate to illustrating a particular unit action. Certain aids are appropriate only when a span of time is addressed (e.g., a battle flow display), some are appropriate only for describing the situation at a specific point (e.g. snapshot), and others can be applied to support either situation. Table 3 provides examples of both marking (specific point in time) and bounding (time span) events.

This step also sets the stage for Tier 1 and Tier 2 AAR systems that can automatically generate AAR aids for users. Marking and bounding events define the data stream used to prepare specific aids. For example, the purpose of a display may be to illustrate that a unit promptly reported contact to the next higher unit. The period of time to be covered by the display begins when contact is made and ends when contact has been reported. If the purpose of the display is to show that a unit did not report contact promptly, the period to the covered begins with contact and ends when a contact report would no longer be considered prompt (e.g., two minutes after contact). Fortunately, the marking and bounding tactical events usually do not differ between a positively stated action and a negatively stated action.

Step Three: Identify Important Situation Variables

The third step in defining standardized aids is to identify aspects of the METT-T situation that need to be examined when applying task standards. This information helps to define the general type of AAR aid needed and the specific design features needed to examine unit behavior. For example, if one is trying to decide if vehicles moving in a platoon maintain appropriate spacing it is important to know the terrain situation. The display must provide information about the spatial distribution of vehicles and the terrain situation. As previously mentioned in this guide the generic types of AAR aids can be implemented in many ways, depending upon the design features needed to illustrate the actions of interest. Table 4 provides examples of METT-T variables that need to be considered when examining unit performance.

Table 3.

Tactical Events Marking or Bounding Actions to be Illustrated by AAR Aids

Actions	Boundaries
Execute a Column Formation	
Change formations too slowly	Unit ordered to move in column formation until 15 seconds after order
Vehicles stop moving when changing formations	" "
Collisions or near collisions	" "
Formation does not fit definition of column in terms of spatial relationships and distances	15 seconds after order to move in column until formation change ordered or contact made
Occupy a platoon BP	
Unit does not move to assigned BP	NLT time
Unit does not report occupation completed by NLT time	Unit reports occupation
Gaps in fields of fire or observations between platoons	NLT time
Gaps in the platoon's coverage of its assigned sector	NLT time
Positions offer poor cover & concealment	NLT time
Process EPW	
Platoon late moving EPW to rear	EPW arrive at rear holding area
Critical information is not provided by reports or tagging of EPWs	Time EPW arrive at rear holding area or platoon reports EPW situation
EPW are not segregated	1st EPW captured & EPW reach rear holding area

Table 4.

Situation Variables Important in Reviewing Unit Actions

Actions	Variables
Execute a column formation	
Formation change takes too long	Terrain
Vehicles stop moving when changing formations	Terrain
Collisions or near collisions	Terrain
Turn flanks towards suspected enemy locations	Terrain & Suspected Enemy Locations
Formation does not fit definition of column in terms of spatial relationships and distances	Terrain
Occupy a platoon BP	
The platoon does not move to the assigned BP	Location of assigned BP
Unit does not report occupation completed by NLT time	NLT time
Gaps in fields of fire or observation between platoons	Limits of platoon's BP platoon's sector of fire, terrain
Gaps in platoon's coverage of its assigned sector	Limits of platoon's BP, platoon's sector of fire, terrain
Positions offer poor cover and concealment	Terrain
Process EPW	
Late moving EPW to rear	Time EPW are captured
Critical information is not provided by reports or EPW tagging (number captured, date and time) EPW are not segregated.	

Step Four: Estimate Display Requirement

The job of describing display requirements is largely complete by the time proponents finish step three. Step four provides proponents with the opportunity to specify a type of aid or types of aids appropriate to applying a specific aspect of a task standard. Step four is where a proponent may describe an idea for a new type of display, a new graph, a new data table, or the addition of new features to existing types of displays.

It is important to consider that more than one type of aid may be of use in examining a particular aspect of unit behavior. In such cases it is useful to identify the different types of AAR aids that would be appropriate. There are many cases in Table 5, for example, where either a 2D or 3D replay can be used.

Table 5.

Display Requirements for Illustrating Actions

Actions	Display
Execute a Column Formation	
Formation change takes too long	2D/3D replay or video
Vehicles stop when changing formations	2D, 3D replay + show vehicle speeds
Collisions or near collisions	2D/3D replay or video
Turning flanks towards suspected enemy locations	" " (show enemy with 2D & enemy perspective for 3D and video
Formation does not fit definition of column in terms of spatial relationships and distances	2D
Occupy a BP	
Unit does not move to assigned BP	2D, 3D or video clip
Unit does not report occupation completed by NLT time	Timeline showing NLT and report time or time-tagged replay of report
Gaps in fields of fire or observation between platoons & Gaps in platoon's coverage of its assigned sector	Range fan showing areas covered by observation and fire
Positions offer poor cover and concealment	3D or video clip from enemy's perspective
Process EPW	
Late moving EPW to rear	Timeline showing when EPW were captured and when EPW arrived at rear holding area
Critical information is not provided by reports or EPW tagging	Replay of reports or EPW tags

The Role of a Flexible AAR Aid Editing System

If AAR systems allow users to change AAR aids to be automatically produced and also make last minute edits in aids, then proponents need not worry about having a perfect set of standard aids prior to initial fielding of these systems. Both capabilities are within the state of the art of AAR systems, but proponents must perform certain analytical tasks early to ensure implementation of these capabilities.

Capability to Edit the Time Addressed by AAR Aids

There will be times when automatically generated aids do not meet user needs in terms of the time addressed, such as when a significant event occurs immediately beyond the period covered by an aid. We need to provide users with the ability to change the point or span of time addressed by aids. The Automated Training Analysis and Feedback System (ATAFS), for example, gives users the capability to edit AAR aids, including the ability to change time (Brown, Wilkinson, Nordyke, Hawkins, Robideaux, and Huyssoon, 1996; Brown, Wilkinson, Nordyke, Hawkins, Riede, Robideaux, and Huysson, 1996). In the example in Figure 9 a user could change the end time to include an event that occurred after the contact report. ATAFS is able to support editing of time, because it saves definitions of aids that it can apply to a log file of exercise data rather than saving the aid per se.

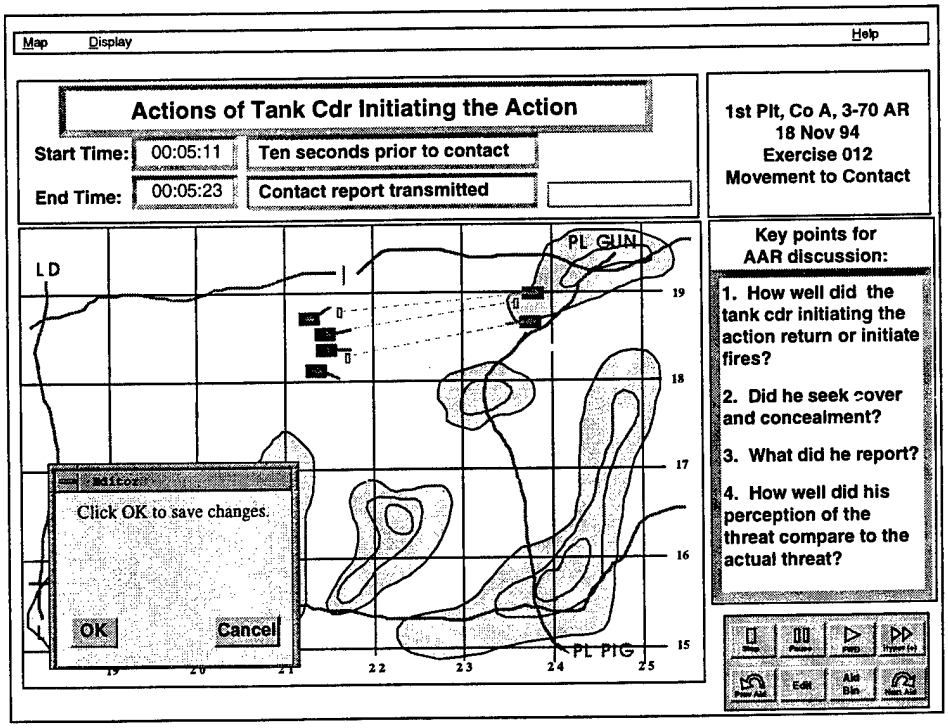

Figure 9. AAR aid editing screen.

Capability to Implement the Automation of New AAR Aids or Modify Existing Aids

The STAARS interface that will allow proponents to change Tier I products has yet to be designed, but we have an idea how this system will work based upon similar products. Figures 10 and 11 illustrate an interface that can be used to automate the production of a new aid (Brown, Wilkinson, Nordyke, Riede, Huyssoon, Aguilar, Wonsewitz, and Meliza, 1997; Brown, Wilkinson, Noredyke, Riede, Robideaux, and Huysson, 1995). In this example, the user has decided to automate the production of an animated 2D display covering a period that begins when a platoon crosses its Line of Departure (LD) and ending when enemy contact is reported within the platoon. The user selects a movie camera icon (representing an animated 2D display) to specify the type of aid to be created. The user selects a line icon and positions it next to a green light to specify a line crossing will begin the period covered by the aid. He or she then selects a "prompt" icon and positions it next to the stop sign to specify a trainer's observation that an event has occurred (e.g., contact has been reported) will end the period addressed by the aid. The user can then give the aid a descriptive name and name the events that will trigger the production of the aid.

Figure 11 shows how a user can complete the process of automating the production of an aid by providing more specific descriptions of the trigger events. In this case, the user has selected a Phase Line from a list of lines and has responded to a menu that allows selection of the criteria for assessing when a unit has crossed the LD (i.e., when the first vehicle, center of mass, or last vehicle crosses the line).

A user can modify these standardized AAR aids by changing the type of aid to be created, the type of triggers used to begin and end the period addressed by the aid, the parameters used to define triggers, the title of the aid, and the description of the tactical events associated with the start and stop points of the period addressed by the aid.

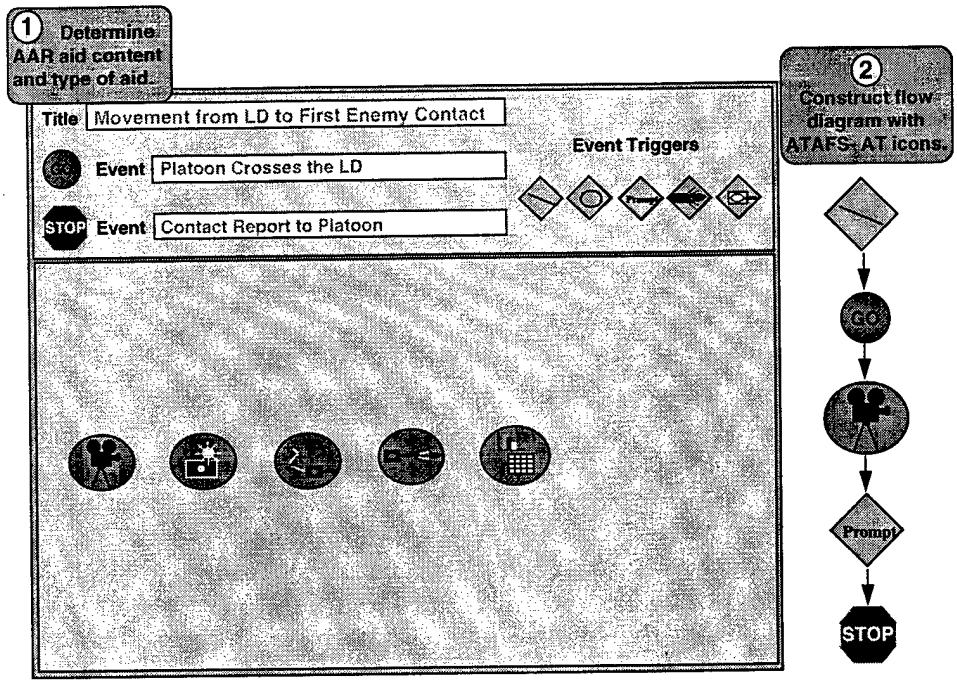

Figure 10. Screen for authoring or modifying AAR aids to be automatically generated.

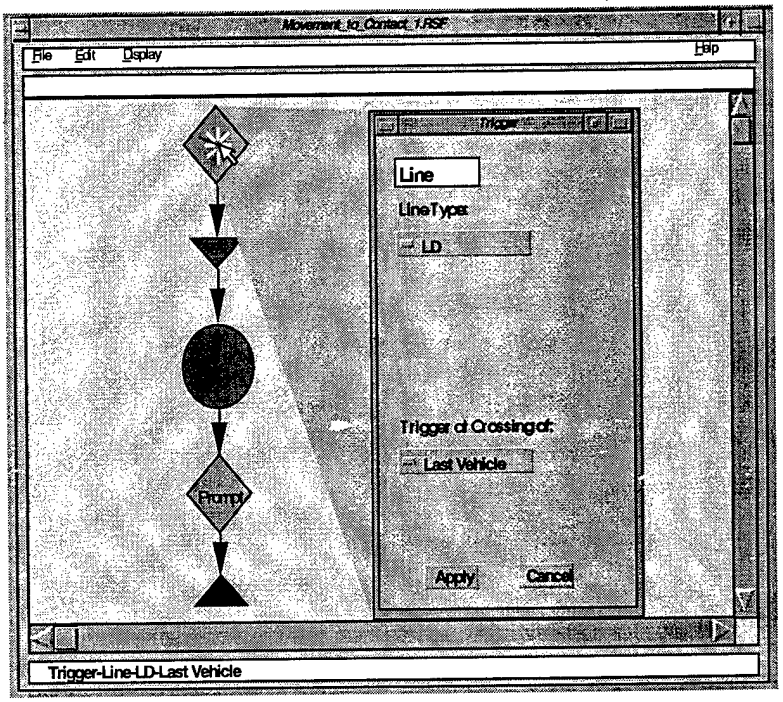

Figure 11. Screen for selecting criteria for deciding when marking or bounding events triggering AAR aid production have occurred.

What Proponents Should Do to Support the Implementation of Flexible Systems

There are two sets of decisions that must be made by proponents prior to the initial fielding of a STAARS. Proponents must decide what types of displays will be used for AARs, and they must identify the tactical events and event parameters likely to be of interest to the unit types and echelons for which they have proponency. U.S. Army Simulation Training and Instrumentation Command engineers, given this information, can look across the requirements of a various user groups to decide whether it is feasible for set of AAR software to apply to a wide variety of groups. Information about the requirements of specific user groups can also be used to implement standardized AAR products and the capability for users to modify standardized AAR aids.

Summary

AAR aids can be used to help trainers diagnose unit strengths and weaknesses prior to the AAR. They can also be used to refresh memories of unit members regarding exercise events, provide new perspectives regarding exercise events, document problems in unit performance, describe alternative courses of action a unit can take in the future, stimulate unit participation in the AAR process, and document the results of an AAR session.

The STAARS concept is intended to facilitate training feedback across the live, virtual and constructive environments. Standardization of AAR products across these environments for particular unit types and echelons facilitates the development of software that can be used to automate the AAR aid preparation process. Standardization makes it possible to examine AAR aid requirements across unit types, echelons, and environments and envision a minimum number of software systems that can apply across training situations, reducing the costs of developing and maintaining AAR software. Standardization also helps to make sure that units can readily interpret the training points the various aids attempt to make.

The process of standardizing AAR aids is made difficult by the fact that most units have very limited experience with the different types of displays that can be used to support AARs. This report describes a process whereby the proponents for specific unit types and echelons can define standardized AAR products. This process involves deciding what performance problems a proponent may want to illustrate for collective tasks described in MTP documents, deciding what aspects of the tactical situation need to be included when assessing specific problems, and identifying tactical events that mark or bound the time period to be covered by the aid. In an optional fourth step, a proponent may even go so far as to specify the specific aids that may be used to illustrate specific behavior problems and describe new types of aids.

By defining standardized AAR products for a particular unit type and echelon, a proponent will have improved input for deciding upon AAR system requirements. Further, by looking across the standardized AAR products for many different unit types, the U.S. Army may find that it can reduce the total number of AAR systems that need to be developed and maintained to just a few.

References

Department of the Army (1988). Mission training plan for the tank platoon (ARTEP 17-237-10-MTP). Washington, DC.

Department of the Army (1993). A leader's guide to after action reviews (TC 25-20). Washington, DC: Author.

Department of the Army. Mission need statement (MNS) for the Standard Army After Action Review System (STAARS), Approved 23 August, 1996.

Brown, B., Nordyke, J., Gerlock, D., Begley, I, & Meliza, L. (1998). Training analysis and feedback aids (TAAF Aids) study for live training support (ARI Study Report 98-04).). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences. (AD A351 107)

Brown, B., Wilkinson, S., Nordyke, J., Hawkins, R., Robideaux, B, & Huyssoon, S.(1996). Demonstrating the concept of an automated training analysis and feedback system (ARI Technical Report 1043). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences.

Brown, B., Wilkinson, S., Nordyke, J., Riede, D., Robideaux, B, & Huysson, S. (1995). Automated training analysis and feedback system authoring tool (ATAFS-AT) draft software user's manual (Contract Number M67004-95-C-0025). Lawton, OK: Advancia Corporation.

Brown, B., Wilkinson, S., Nordyke, J., Hawkins, R., Riede, D., Robideaux, B, & Huysson, S. (1996). Software user's manual for the automated training analysis and feedback system (Contract Number M67004-95-C-0025). Lawton, OK: Advancia Corporation.

Brown, B., Wilkinson, S., Nordyke, J., Riede, D., Huyssoon S., Aguilar, S., Wonsewitz, R. & Meliza, L. (1997). Developing an Automated Training Analysis and Feedback System for Armor Platoons (ARI Research Report 1708). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences. (AD A32 8445)

Fernan, J.C. & Dryer, D.A. (1994). Battle enhanced analysis methodologies (TRAC Research Activities Technical Report 94-1). Monterey, CA: TRADOC Analysis Center -Monterey.

Gubler, J.C. (1997). Unit simulation training system after action reviews (AARs): A novel approach to achieve effectiveness. Unpublished master's thesis. University of Central Florida, Orlando.

Kerins, J.W., Atwood, N.K., & Root, J.T. (1990). Concept for a common performance measurement system for unit training at the national training center (NTC) and with simulation networking (ARI Research Report 1574). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences. (AD A226 956)

McCarthy, J.M. (1997). A cognitive task model of a tactical expert for unit performance diagnosis within the close combat tactical trainer simulation system. Unpublished master's thesis. University of Central Florida, Orlando.

Meliza, L. L. (1997). Standardizing Army After Action Review Systems (ARI Research Report 1702). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (ADA 322 044)

Meliza, L.L., Bessemer, D.W., Burnside, B.L., & Shlechter, T.M. (1992). Platoon-level after action review aids in the SIMNET unit performance assessment system (ARI Technical Report 956). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A254 909)

Meliza, L.L., Bessemer, D.W., & Tan, S.C. (1994). Unit performance assessment system (UPAS) development (ARI Technical Report 1008). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences. (AD 285 805)

Meliza, L.L. & Brown, B. (1996). Increasing the speed flexibility of feedback systems for DIS exercises. Proceedings of the 18th Interservice/Industry Training Systems and Education Conference (pp 132-139).

Meliza, L.L. & Tan, S.C. (1996). SIMNET unit performance assessment system (UPAS) version 2.5 user's guide (ARI Research Product 96-03). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. AD A318 046

National Simulation Center (1997a). Operational Requirements Document (ORD) for the Standard Army After Action Review System (STAARS):STAARS Formal Coordination Draft (26 June 1997).

National Simulation Center (1997b). The Standard Army After Action Review System (STAARS) After Action Review (AAR) Handbook, Version 2.0

Scott, T. D. (1983). Tactical engagement simulation after action review guidebook (ARI Research Product 83-13). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences. (AD A143 014)

Shlechter, T.M., Bessemer, D.W., Rowatt, W.C., & Nesselroade Jr, K.P. (1994). Evaluating the unit performance assessment system's after action review displays. (ARI Technical Report 997). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences. (AD A281 712)

Sottilare, R. (1995). More than a demo...synthetic theater of war-europe. Army RD&A. PB-70-95-2, 18-20.

Stober, D.R., Kraus, M.K., Foss, W.F., Franceschini. R.W., & Petty, M.D. (1995). Survey of constructive + virtual linkages. Proceedings of the Fifth Conference on Computer Generated Forces and Behavioral Representation, 93-102.

Thorpe, J.A. (1987). The new technology of large scale simulator networking: Implications for mastering the art of warfighting. Proceedings of the Ninth Interservice and Industry Training System Conference, 492-501.